CLAIMS

The invention claimed is:

1. A device for cleaving optical fibers comprising:

a housing having an internal chamber and an elongated opening extending between an exterior end opening exterior of the housing and an inward end communicating with the internal chamber, the elongated opening having a longitudinal axis and being sized to receive an optical fiber to be cleaved, the elongated opening holding the fiber with a longitudinal axis of the fiber in general alignment with the longitudinal axis of the elongated opening and permitting the fiber to extend beyond the inward end of the elongated opening and into the internal chamber;

a head mounted within the housing internal chamber adjacent to the inward end of the elongated opening, the head being reciprocally moveable inward and outward with the inward movement being along an inward travel path having a direction transverse to the longitudinal axis of the elongated opening and hence the longitudinal axis of the fiber when inserted into and extending through the elongated opening, the head having an inward facing fiber bending portion and an inward facing fiber cutting portion with the fiber bending portion extending inward beyond the fiber cutting portion to contact the fiber before the fiber cutting portion as the head moves along the inward travel path, the fiber bending portion being located spaced apart from the inward end of the elongated opening along the longitudinal axis of the elongated opening, and the fiber cutting portion being located between the fiber bending portion and the inward end of the elongated opening along the longitudinal axis of the elongated opening, and adjacent to the inward end of the elongated opening, the head being movable along the inward travel path for cleaving of the fiber from an initial position whereat the head permits the fiber to be inserted into the elongated opening and extend through and beyond the inward end of the elongated opening and into the internal chamber with the fiber bending and fiber cutting portions of the head out of contact with the fiber, through

a first portion of the inward travel path and then through a second portion of the inward travel path to accomplish cleaving of the fiber, to a final position whereat the fiber is cleaved and the head can be returned to the initial position, the fiber bending portion of the head extending sufficiently inward beyond the fiber cutting portion of the head such that during the first travel portion the fiber bending portion contacts and bends the fiber to induce tension in the fiber with the fiber cutting portion remaining out of contact with the fiber, and the fiber cutting portion of the head extending inward less than the fiber bending portion such that during the second travel portion the fiber cutting portion contacts and at least partially cuts the fiber while the fiber bending portion of the head continues to contact and increase the bend of the fiber to cause separation of a cut end of the fiber as the head is moved toward the final position;

an actuation member having a user operable portion positioned exterior of the housing for application of an inward force thereto and an engagement portion positioned to engage the head and apply the inward force to the head to move the head along the inward travel path from the initial position to the final position; and

a return member arranged to apply an outward force to the head to move the head outward along an outward travel path between the final position and the initial position when the inward force on the head is sufficiently removed, whereby after insertion of an optical fiber through the elongated opening and into the internal chamber, the head is moved along the inward travel path by applying the inward force on the user operable portion of the actuation member to sequentially bend, and then cut and further bend the fiber to cleave off the cut end of the fiber.

2. The cleaving device of claim 1 further including a receptacle removably connected to the housing and having a collection compartment in communication with the internal chamber and positioned and sized to receive and collect the cut off ends of a plurality of cleaved fibers.

3. The cleaving device of claim 1 for use with a fiber sheathed within an insulating ferrule such that the fiber extends outwardly from the ferrule exposing a free end portion thereof, wherein the elongated opening is large enough to receive the ferrule, and further including a positioning member positioned to engage and limit travel of the ferrule into the internal chamber and hold the ferrule at a predetermined location along the longitudinal axis of the elongated opening, the fiber cutting portion of the head being spaced apart away from the positioning member along the longitudinal axis of the elongated opening by an amount sufficient to leave a predetermined, exposed length of the fiber extending beyond the ferrule after the cut off end is separated from the fiber.

4. The cleaving device of claim 3 wherein said positioning member is a stop shoulder positioned in the internal chamber and extending partially over the inward end of the elongated opening in the housing sufficient to engage an inward end of the ferrule and limit travel of the ferrule into the internal chamber while allowing the fiber to extend past the stop shoulder and further into the internal chamber to at least a position to be engaged by the fiber bending portion of the head as the head moves along the inward travel path.

5. The cleaving device of claim 4 for use with a glass fiber having a diameter of approximately 125 micrometer, the fiber cutting portion of the head being spaced apart from the stop shoulder along the longitudinal axis of the elongated opening by an amount sufficient to effect cutting of the fiber at approximately 4 one-thousandths inch (100 micrometers) distance along the fiber from the stop shoulder.

6. The cleaving device of claim 1 wherein the fiber cutting portion of the head is a knife.

7. The cleaving device of claim 6 wherein the knife is a diamond knife.

8. The cleaving device of claim 1 wherein the head is a boot-shaped pushing head mechanism having a toe comprising the fiber bending portion.

9. The cleaving device of claim 1 for use with a fiber enclosed by a sheath such that the fiber extends outwardly from the sheath exposing a free end portion thereof, wherein the elongated opening is large enough to receive the sheath, and further including a positioning member positioned to engage and limit travel of the sheath into the internal chamber and hold the sheath at a predetermined location along the longitudinal axis of the elongated opening, the fiber cutting portion of the head being spaced apart away from the positioning member along the longitudinal axis of the elongated opening by an amount sufficient to leave a predetermined, exposed length of the fiber extending beyond the sheath after the cut off end is separated from the fiber.

10. The cleaving device of claim 9 further including an internal member positioned within the internal chamber, the internal member having first and second surface portions, the first surface portion comprising the positioning member and being located toward the inward end of the elongated opening and extending partially over the inward end of the elongated opening to engage an inward end of the sheath while allowing the fiber to extend past the first surface portion and further into the internal chamber to a position to be engaged by the fiber bending portion of the head as the head moves along the inward travel path, and the second surface portion being positioned on an opposite side of the internal chamber from the head with the fiber therebetween when extending into the internal chamber, and extending laterally away from the fiber when extending into the internal chamber sufficient to remain out of contact with the fiber when in contact with and being bent by the fiber bending portion of the head as the head moves along the inward travel path.

11. The cleaving device of claim 1 wherein the engagement portion of the actuation member is a connecting rod and the user operable portion of the actuation

member is a manually depressible plunger, the connecting rod having an inward end connected to the head and an outward end connected to the plunger, wherein the return member is a spring positioned to apply the outward force to the head through the connecting rod, and wherein the plunger is reciprocally mounted within a chamber in a sidewall of the housing.

12. The cleaving device of claim 11 wherein the plunger is positioned for depressing by a thumb of the user's hand grasping the housing.

13. The cleaving device of claim 1 wherein the internal chamber is of sufficient size to allow unobstructed insertion of the fiber beyond the inward end of the elongated opening and into the internal chamber, with the fiber being unbent by the cleaving device when the fiber bending and fiber cutting portions are in their initial positions.

14. A device for cleaving optical fibers comprising:

a housing having an internal chamber and an opening extending between an exterior end opening toward an exterior of the housing and an inward end communicating with the internal chamber, the opening being sized and oriented to receive an optical fiber to be cleaved and permit the fiber therein to extend beyond the inward end of the opening and into the internal chamber;

an inward facing fiber bending member and an inward facing fiber cutting member mounted within the housing internal chamber and each being reciprocally moveable inward toward the fiber within the internal chamber and outward away from the fiber within the internal chamber, with the inward movement being along an inward travel path having a direction transverse to a longitudinal axis of the fiber when inserted into and extending through the opening and into the internal chamber, the fiber bending member being located spaced apart from the inward end of the opening along the longitudinal axis of the fiber when inserted into and extending through the opening and

into the internal chamber, and the fiber cutting member being located between the fiber bending member and the inward end of the opening, the fiber bending member and the fiber cutting member being movable along the inward travel path for cleaving of the fiber from initial positions for each whereat the fiber can be inserted into the opening and extend through and beyond the inward end of the opening and into the internal chamber with the fiber cutting member out of contact with the fiber, through a first portion of the inward travel path and then through a second portion of the inward travel path to accomplish cleaving of the fiber, to a final position for each whereat the fiber is cleaved and the fiber bending member and the fiber cutting member can be returned to their initial positions, the fiber bending member being arranged such that during the first travel portion the fiber bending member contacts and bends the fiber to induce tension in the fiber with the fiber cutting member remaining out of contact with the fiber, and the fiber cutting member being arranged such that during the second travel portion the fiber cutting member contacts and at least partially cuts the fiber while the fiber bending member continues to contact and increase the bend of the fiber to cause separation of a cut end of the fiber as the fiber bending member and the fiber cutting member are moved toward their final positions; and

an actuation member having a user operable portion positioned exterior of the housing for application of an inward force thereto and an engagement portion positioned to apply the inward force to the fiber bending member and the fiber cutting member to move the fiber bending member and the fiber cutting member along the inward travel path from their initial positions to their final positions, whereby after insertion of an optical fiber through the opening and into the internal chamber, the fiber bending member and the fiber cutting member are moved along the inward travel path by applying the inward force on the user operable portion of the actuation member to sequentially bend, and then cut and further bend the fiber to cleave off the cut end of the fiber.

15. The cleaving device of claim 14, further including a return member arranged to apply an outward force to the fiber bending member and the fiber cutting member to move the fiber bending member and the fiber cutting member outward along an outward travel path between their final positions and their initial positions when the inward force thereon is sufficiently removed.

16. The cleaving device of claim 14 wherein the fiber bending member and the fiber cutting member fiber bending member are coupled to move as a unit, and the fiber bending member extends inward beyond the fiber cutting member to contact the fiber before the fiber cutting member as the fiber bending member and the fiber cutting member move along the inward travel path.

17. The cleaving device of claim 14 wherein the internal chamber is of sufficient size to allow unobstructed insertion of the fiber beyond the inward end of the opening and into the internal chamber, with the fiber being unbent by the cleaving device when the fiber bending and fiber cutting members are in their initial positions.

18. The cleaving device of claim 14 for use with a fiber enclosed by a sheath such that the fiber extends outwardly from the sheath exposing a free end portion thereof, wherein the opening is large enough to receive the sheath, and further including a positioning member positioned to engage and limit travel of the sheath into the internal chamber and hold the sheath at a predetermined location, the fiber cutting member being spaced apart away from the positioning member along the fiber when extending into the internal chamber by an amount sufficient to leave a predetermined, exposed length of the fiber extending beyond the sheath after the cut off end is separated from the fiber.

19. The cleaving device of claim 14 for use with a fiber enclosed by a sheath such that the fiber extends outwardly from the sheath exposing a free end

thereof, wherein the opening is large enough to receive the sheath, further including an internal member positioned within the internal chamber, the internal member having first and second surface portions, the first surface portion comprising a positioning member and being located toward the inward end of the opening and extending partially over the inward end of the opening to engage an inward end of the sheath while allowing the fiber to extend past the first surface portion and further into the internal chamber to a position to be engaged by the fiber bending member as the fiber bending member moves along the inward travel path, and the second surface portion being positioned on an opposite side of the internal chamber from the fiber cutting and fiber bending members with the fiber therebetween when extending into the internal chamber, and extending laterally away from the fiber when extending into the internal chamber sufficient to remain out of contact with the fiber when in contact with and being bent by the fiber bending member as the fiber cutting and fiber bending members move along the inward travel path.

20. The cleaving device of claim 14 for use with a fiber sheathed within an insulating ferrule such that the fiber extends outwardly from the ferrule exposing a free end portion thereof, wherein the opening is large enough to receive the ferrule, and further including a positioning member positioned to engage and limit travel of the ferrule into the internal chamber and hold the ferrule at a predetermined location, the fiber cutting member being spaced apart away from the positioning member by an amount sufficient to leave a predetermined, exposed length of the fiber extending beyond the ferrule after the cut off end is separated from the fiber.

21. The cleaving device of claim 20 wherein said positioning member is a stop shoulder positioned in the internal chamber and extending partially over the inward end of the opening in the housing sufficient to engage an inward end of the ferrule and limit travel of the ferrule into the internal chamber while allowing the fiber to extend past the stop shoulder and further into the internal chamber to at least a position

to be engaged by the fiber bending member as the fiber bending member and the fiber cutting member move along the inward travel path.

22. The cleaving device of claim 21 for use with a glass fiber having a diameter of approximately 125 micrometer, the fiber cutting member being spaced apart from the stop shoulder along the longitudinal axis of the fiber when inserted into and extending through the opening and into the internal chamber by an amount sufficient to effect cutting of the fiber at approximately 4 one-thousandths inch (100 micrometers) distance along the fiber from the stop shoulder.

23. The cleaving device of claim 14 further including a receptacle removably connected to the housing and having a collection compartment in communication with the internal chamber and positioned and sized to receive and collect the cut off ends of a plurality of cleaved fibers.

24. The cleaving device of claim 14 wherein the fiber cutting member is a knife.

25. The cleaving device of claim 24 wherein the knife is a diamond knife.

26. The cleaving device of claim 14 for use with a fiber enclosed by a sheath such that the fiber extends outwardly from the sheath exposing a free end portion thereof, wherein the opening is large enough to receive the sheath, and further including a positioning member positioned to engage and limit travel of the sheath into the internal chamber and hold the sheath at a predetermined location, the fiber cutting member being spaced apart away from the positioning member by an amount sufficient to leave a predetermined, exposed length of the fiber extending beyond the sheath after the cut off end is separated from the fiber.

27. The cleaving device of claim 14 wherein the engagement portion of the actuation member is a connecting member and the user operable portion of the actuation member is a manually depressible plunger, the connecting member being connected to the fiber bending member and the fiber cutting member, and connected to the plunger to transmit the inward force applied by the user to the fiber bending member and the fiber cutting member to move them along the inward travel path.

28. The cleaving device of claim 27, further including a spring positioned to apply an outward force to the fiber bending member and the fiber cutting member.

29. The cleaving device of claim 27 wherein the connecting member is reciprocally mounted in a sidewall of the housing.

30. The cleaving device of claim 27 wherein the plunger is positioned for depressing by a thumb of the user's hand grasping the housing.

31. The cleaving device of claim 14 wherein the fiber bending member in its initial position is located out of contact with the fiber when inserted into the opening and extends through and beyond the inward end of the opening and into the internal chamber.

32. The cleaving device of claim 14 wherein the fiber cutting and fiber bending members comprise portions of a head mounted within the internal chamber for reciprocal movement inward and outward with the inward movement being along the inward travel path, the engagement portion of the actuation member being coupled to the head to apply the inward force on the user operable portion to move the head inward along the inward travel path in response thereto.